

Reserve Advisors

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October 18, 2004

**Thornhill Community Association, Inc.
Charlotte, North Carolina**

EXECUTIVE SUMMARY

At the direction of the Board that recognizes the need for proper reserve planning, we have conducted a *Precision 20/20 Full Reserve Study* of Thornhill Community Association, Inc. (Thornhill) located in Charlotte, North Carolina and submit our findings in this report. The effective date of this study is the date of our visual, noninvasive inspection, March 19, 2004. This Reserve Study is a budget planning tool that identifies the current status of the reserve fund and a stable and equitable Reserve Funding Plan to offset the anticipated future major common area expenditures.

This study is in compliance with and exceeds the standards set forth by Community Associations Institute (CAI) and the Association of Professional Reserve Analysts (APRA) fulfilling the requirements of a "Full Reserve Study." For brevity, we use the term Reserve Study herein. A Reserve Study comprises two parts:

Physical Analysis

- Component Inventory
- Condition Assessment
- Estimated Useful Life, Remaining Useful Life and Replacement Cost

Financial Analysis

- Fund Status
- Funding Plan

Exhibit B presents the numerical data of the Physical and Financial Analyses.

Thornhill Community Association, Inc. is a planned unit development which is responsible for the common elements shared by 486 single family homes. The majority of the common elements were constructed in 1990. The development contains a pavilion, two pools, recreation area, pond and landscaped areas. Forty-five major common elements are likely to require capital repair or replacement during the next 30 years.

The unaudited cash status of the reserve fund, as of December 31, 2004, as projected by representatives of the Board is \$66,463. If the Association were to continue to fund reserves at its 2004 budgeted amount of \$35,071, the reserve fund would incur a potential shortage by 2011. The Funding Goal of this Reserve Study is to keep the reserve balance above an adequate, not excessive, threshold.

Thornhill can fund capital repairs and replacements in any combination of the following:

- 1) Special assessments or increases in the operating budget during years when the shortages occur,
- 2) Loans using borrowed capital for major replacement projects, or;
- 3) Level monthly reserve assessments annually adjusted upward for inflation to increase reserves to fund the expected major future expenditures.

We do not advocate special assessments or loans unless near term circumstances dictate otherwise. Although loans provide a gradual method of funding a replacement, the costs are higher than if the Association were to accumulate reserves ahead of the actual replacement. Interest earnings on reserves also accumulate in this process of saving or reserving for future replacements, thereby defraying the amount of gradual reserve collections. We do advocate the third method of *Level Monthly Reserve Assessments* with relatively minor annual adjustments. The method ensures that homeowners pay their “fair share” of the weathering and aging of the

commonly owned property each year. Level reserve assessments preserve the property and enhance the resale value of the homes.

This Reserve Study applies the Cash Flow Method to compute the Reserve Funding Plan. The Reserve Funding Plan determines adequate, not excessive, Reserve Contributions through a 30-year Cash Flow Analysis that incorporates the current reserve funds, future interest earned, and projected Reserve Expenditures.

The Reserve Expenditures reflect current and future *local* costs of replacement, projected earned interest, the average annual fund balances and anticipated inflation. Sources for *local* costs of replacement include our proprietary database, historical costs and published sources, i.e., R.S. Means, Incorporated.

We identified the anticipated Reserve Expenditures for Reserve Components during the next 30 years as either near term or long term. *Near term* expenditures relate to capital needs from now through 2009, the next five years beyond this current fiscal year. These *near term* expenditures comprise \$240,219 or about seventeen percent (17.1%) of the next 30 years of **Exhibit B Reserve Expenditures**. The current Reserve Expenditures relate primarily to replacement of playground equipment, wood retaining walls, signage and erosion control.

The Association budgeted \$35,071 for Reserve Contributions in 2004. We recommend that the Association adopt a reserve budget of \$38,800 in 2005. Afterwards, the Association should budget gradual annual increases in reserve funding, that in part consider the effects of inflation through 2034, the limit of this study's Cash Flow Analysis. The recommended year

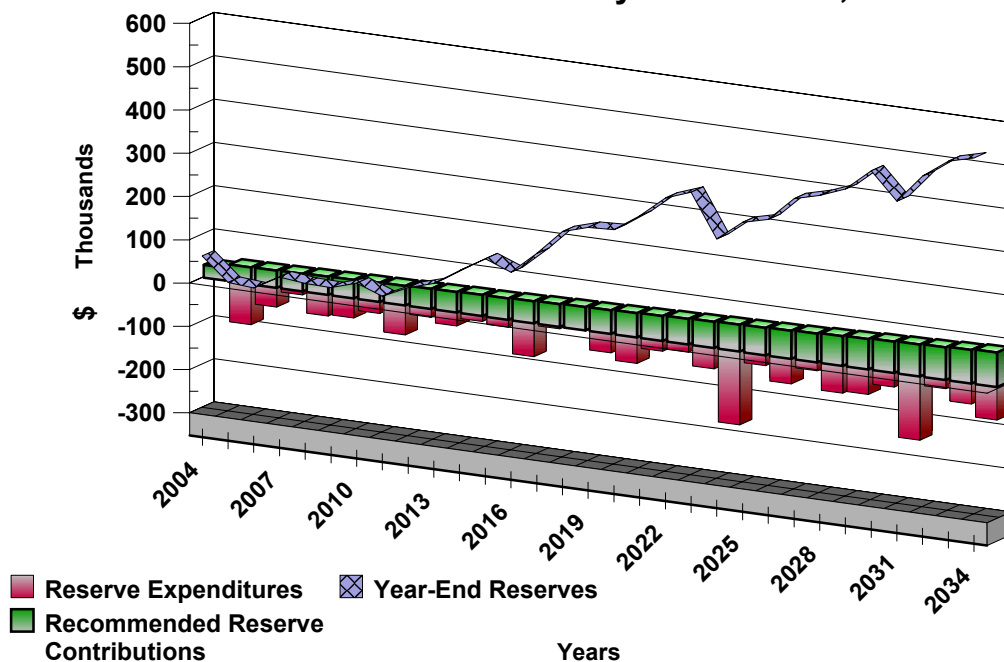
2005 Reserve Contribution of \$38,800 is \$3,729 more than the prior budgeted amount and represents about a two percent (1.9%) adjustment in the 2004 total Operating Budget of \$193,644. This annual adjustment of \$3,729 is equivalent to an average monthly increase of \$.64 per unit owner. These contributions will gradually create and maintain a Reserve Fund for the major expenditures as identified in **Exhibit B. Exhibit B Reserve Funding Plan** enumerates the details regarding recommended annual Reserve Contributions and projected year end reserve balances.

Based on the investigation and analysis as detailed in the accompanying narrative, we recommend the following Reserve Funding Plan (Reserve Contributions) to offset the anticipated future Reserve Expenditures of the subject Reserve Components during the next 30 years.

Recommended Reserve Contributions

Year	\$	Year	\$	Year	\$
2005	38,800	2015	49,700	2025	63,600
2006	39,800	2016	50,900	2026	65,200
2007	40,800	2017	52,200	2027	66,800
2008	41,800	2018	53,500	2028	68,500
2009	42,800	2019	54,800	2029	70,200
2010	43,900	2020	56,200	2030	72,000
2011	45,000	2021	57,600	2031	73,800
2012	46,100	2022	59,000	2032	75,600
2013	47,300	2023	60,500	2033	77,500
2014	48,500	2024	62,000	2034	79,400

Recommended Reserve Funding Plan
Thornhill Community Association, Inc.



Ongoing Board reviews and an Update of this Reserve Study in two- to three- years are necessary to ensure an equitable funding plan since a Reserve Study is a snapshot in time. Many variables change after the study is conducted that may result in significant homeowner overfunding or underfunding the reserve account. Examples include deferred or accelerated projects based on Board discretion, interest rate changes on reserve investments and *local* construction inflation rate changes. We have not investigated any liabilities against the property.

Respectfully submitted on October 18, 2004 by
RESERVE ADVISORS, INC.

A handwritten signature in black ink, appearing to read 'Theodore J. Salgado', with a long horizontal flourish extending to the right.

Theodore J. Salgado, PRA¹
Reference #: 040166
Visual Inspection and Report by: Justin J. Maier, PRA, RS²

¹ RS (Reserve Specialist) is the reserve provider professional designation of the Community Associations Institute (CAI) representing America's 250,000 condominium, cooperative and homeowners associations.

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NARRATIVE REPORT

At the direction of the Board that recognizes the need for proper reserve planning, we have conducted a *Precision 20/20 Full Reserve Study* of certain property exhibited to us as that of

Thornhill Community Association, Inc.

Charlotte, North Carolina

and submit our findings in this report. The effective date of this study is the date of our visual, noninvasive inspection, March 19, 2004.

Reserves for replacement are the amounts of money required for future expenditures to repair or replace Reserve Components that wear out before the entire facility or project wears out. Reserving funds for future repair or replacement of the Reserve Components is also one of the most reliable ways of protecting the value of the property's infrastructure and marketability.

This Reserve Study uses a 30-year Cash Flow Analysis to project and illustrate the Reserve Funding Plan. National standards³ require a Reserve Component to have a "predictable remaining Useful Life." Estimating Remaining Useful Lives and Reserve Expenditures beyond 30 years is often indeterminate and may involve more than one life cycle for a particular Reserve Component. Construction inflation can also vary greatly over many years.

³ Identified in the APRA "Standards - Terms and Definitions" and the CAI "Terms and Definitions".

Manner of Report Presentation

Our report comprises an Executive Summary, Narrative, Conclusion, Supplementary Information, Definitions and Exhibits. The Executive Summary identifies the property, fiscal considerations, recommended reserve funding and projections concerning reserve funding. The Narrative sets forth the nature and extent of the investigation and includes the following sections:

- Manner of Report Presentation
- Considerations and Methodology
- Identification of Reserve Components
- Condition Assessment
- Explanation of the Exhibits
- Conclusion
- Supplementary Information for Financial Statements

Supplementary Information for Financial Statements contains significant unaudited information from the Reserve Expenditures about Reserve Component categories and estimated current and future replacement costs. Definitions contains terms and definitions used throughout this Reserve Study and the industry. **Exhibits A, B, C, D** and **E** contain pertinent information relating to the analysis.

Exhibit A *Photographs* documents the conditions of various property components as of the date of our visual inspection, March 19, 2004. The Condition Assessment contains references to these photographs.

Exhibit B presents two tables. The first table Reserve Expenditures includes the Reserve Component Inventory, Reserve Expenditures, estimates of future costs and anticipated times of

replacements during the next 30 years. The second table Reserve Funding Plan includes Reserve Contributions for the next 30 years based on Reserve Expenditures.

Exhibit C Reserve Funding Graphs contains two graphs and one pie chart. The graph Recommended Reserve Funding Plan shows the future fund balances based on the anticipated Reserve Expenditures and recommended annual Reserve Contributions during the next 30 years. The second graph Reserve Balances compares the recommended year end amounts of accumulated reserves with the potential shortage of reserves if the Association were to continue contributing to reserves at its current budgeted amount for the next 30 years. The pie chart Estimated Future Reserve Expenditures illustrates the relative importance of Reserve Expenditures and relative funding during the next 30 years.

Exhibit D describes Assumptions of the Reserve Study of how we collect and analyze data. The statement of Professional Service Conditions identifies the general manner of professional services provided, as stated in the original authorized Confirmation of Services for this Reserve Study.

Exhibit E Credentials contains the Firm's Qualifications, Staff Qualifications, the vitae of the Responsible Advisor and Review Coordinator and resources we use in our analysis, i.e., published sources of cost data.

Considerations and Methodology

This Reserve Study is in compliance with and exceeds the standards set forth by Community Associations Institute (CAI) and the Association of Professional Reserve Analysts (APRA) fulfilling the requirements of a “Full Reserve Study.” For brevity, we use the term Reserve Study herein. We considered the following factors in our analysis:

A projected 2004 year ending reserve balance of \$66,463 as provided by the Board

The Cash Flow Method to compute the 30-year Reserve Funding Plan

The identification of individual Reserve Components with their anticipated year of replacement as detailed in **Exhibit B Reserve Expenditures**

Local⁴ costs of material, equipment and labor

The current and future costs of replacement for the Reserve Components

The costs of removal of the worn out elements as part of the cost of replacement

Local economic conditions and a historical perspective to arrive at our estimate of future inflation for *construction costs* in Charlotte, North Carolina at an annual inflation rate of 2.5%.

The past and current maintenance practices of Thornhill and their effects on remaining useful lives.

The Funding Plan excludes necessary operating budget expenditures. It is our understanding that the current operating budget and future operating budgets will provide for the ongoing normal maintenance of Reserve Components or property elements unless specifically identified in the *Reserve Component Inventory* of **Exhibit B Reserve Expenditures**. Thornhill should continue to include these costs of maintenance in the operating budget.

⁴ See **Exhibit E Credentials** for addition information on our use of published sources of cost data.

The anticipated effects of appreciation of the reserves over time in accord with an anticipated future return or yield on investment of your cash equivalent assets at an annual rate of 2.5% (We did not consider the costs, if any, of Federal and State Taxes on income derived from interest and/or dividend income)

Credit markets have bottomed out and interest rates are on a modest rise. The 10-year U.S. Treasury, although somewhat volatile, has hovered for recent months in the range of 4½%. Its current upward trend is more of an indicator of renewed investments in the stock market and not an indicator of inflation. The recovery, however cautious or delayed, is “sufficiently robust, broad based, normal and traditional.”⁵ Some volatility or short term spikes in savings rates are possible with expectations for the 10-year Treasury yield to reach as high as 6% in late 2004 or early 2005.

Higher yields of short term savings instruments (government bonds and CD’s) on reserve savings may decrease the necessary amounts of Reserve Contributions. Opportunities may arise to ‘lock in’ reserve savings at higher rates in 2004. For the time being, we suggest a conservative policy of short term investments using current yield rates on reserve savings to offset the near term effects of construction inflation. Updates to this Reserve Study will continue to monitor historical facts and trends concerning the external market conditions. The following table summarizes rates of inflation and key rates for government securities, generally considered as safe investment alternatives.

⁵ *Economic and Market Perspective*, James W. Paulsen, Ph.D., Wells Capital Management, Nov., 2003.

Interest Rate and Inflation Data								
Actual = (A)	<u>1999 (A)</u>	<u>2000 (A)</u>	<u>2001 (A)</u>	<u>2002:4 (A)</u>	<u>2003:4</u>	<u>2004:1</u>	<u>2004:2</u>	<u>2004:3</u>
Federal Funds	5.00%	6.50%	1.75%	1.25%	1.13%	1.00%	1.00%	1.13%
90-Day Treasury Bill	4.63	5.88	1.74	1.20	1.35	0.95	1.00	1.15
1-Year Treasury Bill	5.40	5.17	3.19	1.75	2.50	1.50	1.65	1.75
10-Year Treasury Note	5.50	5.12	5.13	3.85	4.55	3.85	4.00	4.25
30-Year Treasury Bond	5.60	5.46	5.49	4.80	5.30	4.70	5.00	5.15
Consumer Price Index	2.20	3.40	1.60	2.10	2.50	2.30	2.35	2.40
<u>National Market Savings Rates</u>	1.35%	for Money Market Savings			2.50%	for 3-Year Certificate of Deposit		
	1.90%	for 1-Year Certificate of Deposit			3.50%	for 5-Year Certificate of Deposit		
Estimated Long Term Yield Rate for Reserve Savings					2.5%			
Estimated Long Term Inflation Rate for Future Capital Expenditures					2.5%			

as of 3/10/04

We advise the Board to consult a professional investment counselor to determine an appropriate investment strategy to maximize the returns on reserve savings in light of the recent changes in near term yields on money market accounts and certificates of deposits.

Identification of Reserve Components

Thornhill Community Association, Inc. is a planned unit development which is responsible for the common elements shared by 486 single family homes. The majority of the common elements were constructed in 1990. The development contains a pavilion, two pools, recreation area, pond and landscaped areas. Forty-five major common elements are likely to require capital repair or replacement during the next 30 years.

Our investigation included Reserve Components or property elements as set forth in your Declaration. Our analysis began by segregating the property elements into several areas of responsibility for repair and replacement. We derived these segregated classes of property from our review of the information provided to us and through conversations with representatives of the Board. These five classes of property include:

- 1) Reserve Components
- 2) Long Lived Property Elements
- 3) Operating Budget Funded Repairs and Replacements
- 4) Property Maintained by Homeowners
- 5) Property Maintained by Others

We advise that the Board conduct an annual review of these classes of property to confirm its policy concerning the manner of funding, i.e., from reserves or the operating budget. The following pages briefly describe these five classes.

Reserve Components are defined as property elements with: 1) Association responsibility; 2) limited Useful Life expectancies; 3) predictable Remaining Useful Life expectancies; and 4) a replacement cost above a minimum threshold.

The Reserve Components comprise 45 line items likely to require Reserve Expenditures during the next 30 years. **Exhibit B Reserve Expenditures** details this first class of property which we summarize as follows:

Pavilion Elements (Line Items 1 through 4)

- Deck, Membrane Applications
- Masonry, Inspection and Capital Repairs
- Roof, Asphalt Shingles
- Wood Stairs

Property Site Elements (Line Items 5 through 23)

- Asphalt Pavement, Crack Repair, Patch & Seal Coat
- Asphalt Pavement, Repaving, Total Replacement
- Asphalt Curbs, Proposed
- Catch Basins, Capital Repairs
- Concrete Sidewalks, Partial Replacements
- Dam, Inspection and Capital Repairs
- Irrigation System
- Irrigation System, Controllers
- Monuments, Inspection and Masonry Capital Repairs
- Picnic Tables
- Playground Equipment
- Pond, Aerator
- Pond, Dredge
- Pond, Erosion Control
- Pond, Pedestrian Bridges, Phased Replacements
- Retaining Walls, Timber (replace with masonry)
- Signage
- Tennis Courts, Color Coat
- Tennis Courts, Fence
- Tennis Courts, Surface Replacement

Pool and Pool House Elements (Line Items 24 through 45)

- Concrete Deck, Inspection and Repairs
- Covers
- Doors, "high grade"
- Doors, "medium grade"
- Fence, Chain Link (replace with metal picket)

- Fence, Metal Picket
- Main Pool, Fiberglass Coating
- Main Pool, Gel Coat
- Main Pool, Waterline Tile
- Main Pool, Pumps
- Main Pool, Filters
- Main Pool, Chemical Pumps
- Baby Pool, Fiberglass Coating
- Baby Pool, Waterline Tile
- Baby Pool, Pump
- Baby Pool, Filter
- Baby Pool, Chemical Controller and Pump
- Furniture
- Light Fixtures, Bollard
- Light Posts and Fixtures
- Pool House, Interior Renovation
- Pool Lights

In addition to the Reserve Components listed above, we list the following Long-Lived Property Elements, defined as those items without predictable Remaining Useful Life expectancies:

- Dam Structure
- Electrical Systems
- Foundations
- Guard House Roof
- Masonry Retaining Walls (adjacent to pool)
- Pool Structure
- Sewer and Water Pipes
- Structural Frames (including roof trusses at pavilion)

Long-Lived Property Elements (without predictable Remaining Useful Lives) may require infrequent repairs due to abuse, normal wear and tear or unknown construction defects. Thornhill should fund the cost of these infrequent replacements from the operating budget. Funding untimely or unexpected replacements from reserves will necessitate adjustments to future Reserve Contributions. An update of this Reserve Study will help determine the merits of adjusting the Reserve Funding Plan.

The operating budget provides money for the repair and replacement of certain Reserve Components. Operating Budget Funded Repairs and Replacements relate to:

- General Maintenance to the Common Elements
- Basketball Goal
- Gravel Access Road
- Irrigation System
- Landscape
- Lifeguard Chairs
- Monument Light Fixtures
- Monument Lighting
- Paint Finishes, Pool House Interior
- Pond Bathymetric Profile
- Pool Multi-Ports
- Pool Filter Sand Changes
- Water Heater
- Other Repairs Normally Funded Through the Operating Budget

Certain items have been designated as the responsibility of the homeowner to repair or replace. Property Maintained by Homeowners relates to unit:

- Individual Lots

Certain items have been designated as the responsibility of others to repair or replace.

Property Maintained by Others relates to:

- Streets
- Street Lighting

Condition Assessment

The Condition Assessment of this *Precision 20/20 Reserve Study* includes *Enhanced Solutions and Procedures (ESP)* for select significant components. These narratives describe the Reserve Components, document specific problems and conditions, and may include detailed solutions and procedures for necessary capital repairs and replacements for the benefit of current and future board members. We advise the Board use this information to help define the scope and procedures for repair or replacement when soliciting bids or proposals from contractors. *However, the Report in whole or part is not and should not be used as a design specification or design engineering service.*

Pavilion Elements

Deck, Membrane Applications - The pavilion at Thornhill is an open-air structure with a concrete floor deck and a sloped roof overhead. Beneath the pavilion is the pool house. As the pavilion is an open-air structure, wind-blown rain could easily contact the concrete deck of the pavilion and penetrate through to the pool house below. For this reason, we anticipate there is a roof membrane concealed between the ceiling of the pool house and the concrete floor of the pavilion. However, we were unable to verify the existence of an underlying roof membrane due to the noninvasive nature of our inspection. Replacement of the underlying roof membrane is costly as it requires removal and replacement of the concrete deck. In lieu of replacement of the underlying membrane, the Association could apply a liquid membrane, such as an elastomeric membrane, on top of the concrete deck. This alternative replacement would result in substantial cost savings.

The underlying roof membrane has a useful life of up to 30 years. However, the Association should apply a membrane atop the concrete deck prior to failure of the underlying roof membrane. We recommend Thornhill budget for the application of a membrane by 2012 and every eight years thereafter. Line Item 1 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times of applications.

Masonry, Inspection and Capital Repairs - The Association maintains approximately 2,800 square feet of stone veneer at the columns and chimneys, 1,300 square feet of the concrete pavilion deck and 800 square feet of parged concrete masonry units at the walls of the pool house. We noted areas of missing and damaged stone veneer, cracks in the concrete deck and cracks in the parge coat over the concrete masonry units. Page 2 of **Exhibit A Photographs** depicts this condition. We recommend the Association budget for repairs to these areas in 2005 and every 15 years thereafter.

Roof - The pavilion roof comprises 22 *squares*⁶ of asphalt shingles. The roof is in good to fair condition at an age of 14 years. The useful life of an asphalt shingle roof is from 20- to 25-years. We recommend the Association anticipate replacement of the pavilion roof by 2012 and again by 2034. Replacement should include removal of the existing roof to the sheathing and installation of a new roofing system. Line Item 3 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times of replacements.

Wood Stairs - The wood stairs leading from the pavilion down to the pool area comprise approximately 200 square feet horizontally. The stairs are in good overall condition at an age of 14 years. Wood stair materials have a useful life of 12- to 18-years with proper maintenance.

⁶ We quantify the roof area in *squares*, where one square is equal to 100 square feet of surface area.

However, the rates and types of deterioration are not uniform due to the nature of wood. Replacement is normally an ongoing process which eventually leads to a complete replacement for economic or aesthetic reasons. Prior to their complete replacement, the Association should repair or replace sections of split, deteriorated and warped wood and apply a sealer to help maximize the remaining useful life of the stairs. We recommend the Association anticipate complete replacement by 2008 and again by 2026, including the wood rails at the pavilion, and fund interim repairs and partial replacements through the operating budget as needed.

Property Site Elements

Asphalt Pavement, Crack Repair, Patch and Seal Coat - Asphalt pavement comprises 2,350 square yards of parking at the pavilion. Parked vehicles leak motor oil and other fluids that can damage asphalt pavement. We recommend periodic *seal coat* applications to maintain the pavement. Seal coat applications minimize the damaging effects of these vehicle fluids, maintain a uniform and positive appearance, and maximize the useful life of the pavement. The Association should plan future applications every four- to six-years. We elaborate on solutions and procedures necessary for the optimal maintenance of asphalt pavement in the following discussion.

There are four main types of seal coats available: fog coat, acrylic sealer, chip seals and asphaltic emulsion. A *fog coat* is a simple mixture of water and asphalt. *Acrylic sealers* include an acrylic additive to the water and asphalt mixture for greater resistance to abrasion. *Fog coats* and *acrylic sealers* are typically spray applied and are only for aesthetic purposes. *Chip seal* is the most substantial type of seal coat which involves placement of oil and aggregate on the driving surface. Either a roller or normal vehicular traffic works the gravel into the oil.

Asphaltic emulsions combine a sharp sand mixture or mineral fibers and an emulsifying agent with the water and asphalt mixture. *Asphaltic emulsions* are typically hand applied with squeegees to ensure that the sealer fills surface abrasions and minor cracks. This prevents the infiltration of water through cracks into the underlying pavement base. Seal coats therefore minimize the damaging effects of water from expansion and contraction. We regard *asphaltic emulsions* as the most effective and economical type of seal coat.

Thornhill should repair any isolated areas of deteriorated pavement prior to seal coat applications. Proposals for seal coat applications should include both crack repair and area patching. These activities reduce water infiltration and the effects of freeze and thaw cycles. The contractor should only apply seal coat applications after remedial crack and surface repairs are completed. A seal coat does not bridge or close cracks, therefore, unrepaired cracks render the seal coat applications useless. Our future estimates of cost include an allowance for both crack repair and area patching.

We recommend that Thornhill plan the application of seal coat in 2005, 2016, 2021 and again by 2026. These repairs are coordinated with future pavement replacements. We recommend the Association defer the initial application of seal coat until 18 months after asphalt repaving. This initial application of seal coat usually does not require crack repair or area patching. Therefore, we recommend the Association fund this initial application through the operating budget. Line Item 5 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times of these seal coat applications.

Asphalt Pavement, Repaving - The pavement is in good to fair overall condition at an age of 14 years with isolated areas of pavement deterioration. Page 3 of **Exhibit A Photographs** depicts this condition. The useful life of pavement in Charlotte is from 15- to 20-years. We include the following solutions and procedures pertaining to *components* of the pavement, the *manner of repaving, time* of repaving and *coordination* of other possible replacements with the repaving for the benefit of the present and future board members.

Components of asphalt pavement include native soil, aggregate and asphalt. First the contractor creates a base course of aggregate or crushed stone and native soil. The base course is individually compacted to ninety-five percent (95%) dry density prior to the application of the asphalt. Compaction assures a stable base for the asphalt that reduces the possibility of settlement. The initial installation of asphalt uses at least two lifts, or two separate applications of asphalt, over the base course. The first lift is the binder course. The second lift is the wearing course. The wearing course comprises a finer aggregate for a smoother more watertight finish.

The *manner of repaving* is either an *overlay* or *total replacement*. An overlay is a method of repaving that involves the application of an addition lift of asphalt over the existing wearing course. Total replacement includes the removal of all existing asphalt down to the base course of aggregate and native soil followed by the application of two or more new lifts of asphalt. We recommend overlayments on asphalt pavement that exhibits normal deterioration and wear. We recommend total replacement of asphalt pavement that exhibits severe deterioration, inadequate drainage or pavement that has been overlaid multiple times in the past. Based on the apparent visual condition of the asphalt pavement, we recommend the *total replacement* method of repaving at Thornhill.

Total replacement requires the removal of all existing asphalt. The contractor should then augment and compact the existing aggregate and native soil to create a stable base. Finally the contractor should install the new asphalt in at least two lifts.

The *time* of replacement is dependent on the useful life, age and condition of the pavement. The useful life of 15- to 20-years is dependent in part on the maintenance applied to the pavement, the amounts and concentration of auto solvents that penetrate the pavement, the exposure to sunlight and detrimental effects of freeze and thaw cycles during inclement weather. Thornhill should repair any isolated areas of deteriorated pavement concurrent with periodic seal coat applications. The Association anticipates a phased total replacement of the pavement beginning by 2006 and concluding by 2011 and a subsequent phased total replacement beginning by 2026 and concluding by 2031. Line Item 6 of **Exhibit B Reserve Expenditures** notes our estimate of future cost and the Association's anticipated time of repaving. The Association should *coordinate* asphalt repaving with related activities such as replacement of curbs and capital repairs to catch basins.

Asphalt Curbs, Proposed - The pavement at the pavilion is currently lined with 1,300 linear feet of wood timbers. Based on a conversation with representatives of the Board, we propose that the Association replaces the wood timbers with asphalt curbs. The asphalt curbs will ensure that storm water is directed to the catch basins and will complete the pavement system. Similar to the asphalt pavement, the asphalt curbs will have a useful life of 15- to 20-years. We propose this installation in conjunction with phased pavement replacement beginning by 2006 and concluding by 2011 and a subsequent phased replacement beginning by 2026 and concluding by 2031.

Catch Basins - Precast concrete catch basins collect storm water from the pavement and conduct it into the storm water system. The overall condition of the subject two catch basins is good without any *significant* settlement visually apparent. The useful life of catch basins is up to 50 years. However, achieving this useful life usually requires interim capital repairs or partial replacements every 15- to 20-years.

The Association should anticipate the occasional displacement or failure of a catch basin and the surrounding pavement from erosion. Erosion causes settlement around the collar of catch basins. Left unrepaired, the *entire catch basin* will shift and need replacement. Thornhill should plan to repair or replace any displaced or failed catch basins concurrently with surrounding pavement. The exact times and amount of capital repairs or replacements are dependent upon variable natural forces. Based on the age and visually apparent good condition of the catch basins, we recommend the Association anticipate the inspection, capital repair or partial replacement of the two catch basins in conjunction with each replacement of asphalt pavement. Line Item 8 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times of these expenditures.

Concrete Sidewalks - Concrete sidewalks at the pavilion comprise 2,200 square feet. This quantity includes the concrete pad at the basketball court and the sidewalk at the tennis courts. The sidewalks are in good overall condition. This application of concrete have useful lives of up to 65 years although premature deterioration of isolated areas of concrete is common. Inadequate subsurface preparation, improper concrete mixtures or finishing techniques can result in premature deterioration such as settlement, chips, cracks and spalls. Variable conditions like these result in the need to plan for periodic partial replacements of the concrete sidewalks

throughout the next 30 years. We estimate that up to 660 square feet of concrete sidewalks, or thirty percent (30%) of the total, will require replacement during the next 30 years. We recommend the Association budget for replacement of 220 square feet of concrete sidewalks every ten years beginning by 2010. Line Item 9 of **Exhibit B *Reserve Expenditures*** notes our estimate of future costs and anticipated times of replacements.

Dam, Inspection and Capital Repairs - Thornhill maintains an arched masonry dam of approximately 100 linear feet in length and has approximately 2,000 square feet of surface area. The dam is constructed of concrete with stone veneer on the downstream side. There is also a pipe outlet to allow for discharging of the impounded water. Under normal conditions, we do not foresee the need for replacement of the dam during the next 30 years. However, the Association should anticipate periodic capital repairs to the dam. We recommend the Association discharges the impounded water, inspects the upstream and downstream sides of the dam and conducts any necessary repairs every 15 years. Repairs would likely include concrete crack repairs and repairs to the stone veneer. The Association should conduct this work in conjunction with dredging of the pond as dredging will also likely require discharging of the impounded water. Line Item 10 of **Exhibit B *Reserve Expenditures*** notes our estimate of future costs and anticipated times of inspections and capital repairs.

Monuments, Inspection and Masonry Capital Repairs - Thornhill maintains multiple masonry monuments throughout the property. This masonry comprises approximately 6,700 square feet and includes the masonry at the guard house. We noted areas of deterioration primarily near the intersection of Elm Lane and Elmstone Drive. Page 4 of **Exhibit A *Photographs*** depicts this condition. We recommend the Association anticipate an inspection

and capital repairs to the masonry up to every 15 years. These monuments will require periodic repairs as a result of delamination of the stone and mortar deterioration. We recommend Thornhill budget for complete inspection of all the monuments and repairs for up to five percent (5%) or 335 square feet of the masonry in 2005 and every 15 years thereafter. Line Item 11 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times of capital repairs. The Association should fund replacement of the monument light fixtures through the operating budget.

Picnic Tables - Thornhill maintains 10 picnic tables located at the playground, pavilion and pond. The useful life of exterior furniture of this type is 12- to 18-years. The tables are in fair condition at an age of 14 years. We recommend the Association budget for replacement of the picnic tables by 2006 and again by 2022. Line Item 12 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated time of replacements.

Playground Equipment - The Association maintains playground equipment at the pavilion. The playground equipment is in fair condition at an age of six- to 14-years. We include the following solutions and procedures pertaining to replacement of playground equipment for the benefit of present and future board members.

Safety is the major purpose for maintaining playground equipment. We recommend an annual inspection of the playground equipment to identify and repair as normal maintenance loose connections and fasteners or damaged elements. Playworld Systems⁷ is a leading innovator of modular playground equipment. We suggest the Association learn more about the specific

⁷ Reserve Advisors, Inc. does not have any financial or other interest in these companies and includes this reference for informational purposes only.

requirements of playground equipment at <http://www.playworldsystems.com>. We recommend the use of a specialist for the design or replacement of the playground equipment environment. Playground equipment of this type has a useful life of 15- to 20-years. The Association anticipates replacement of the playground equipment, including relocating the equipment, in 2005 at a cost of \$30,000. We include this cost plus inflation for replacement in 2005 and again by 2023 on Line Item 13 of **Exhibit B Reserve Expenditures**.

Pond, Maintenance - The Association maintains a pond which is created by the dam. A small stream flows into the pond. Three common problems with ponds are erosion, build up of silt and algae blooms. We note isolated erosion along the west shoreline. We include the following solutions and procedures as a summary of the minimum requirements for successful pond maintenance for present and future board members.

The objective of water quality management in small bodies of water is to prevent, slow or reverse the eutrophication process. Eutrophication is a process in which a pond becomes more shallow and more biologically productive. Algae are the base of the food chain and supply food for other water life. Therefore, the productivity of a pond is based on the amount of algae present. The aesthetic quality diminishes as the productivity increases.

All ponds go through a natural eutrophication process over time. Human or animal activity often increases the rate of eutrophication. Erosion and storm water deposit fines or silt into the pond and effect the rate of eutrophication. The amount of erosion that enters from the surrounding watershed and shorelines is variable. The amount and intensity of rainfall, soil

saturation levels and ground cover all affect the amount of deposits into the pond. Run-off from construction excavations is another contributor to changes in the depth of the pond.

Lawn fertilizers are another source that contribute to eutrophication. Fertilizers often contain nitrogen and phosphorous which exacerbate nutrient loads into the water system. Introduction of these chemicals and the run off of fertilizers results in a high nutrient loading. Storm water runoff from impervious areas carries this fertilizer into the pond and contributes substantially to the overall nutrient build-up in the water. We advise that Thornhill consider the use of fertilizers with low or no phosphorus content for areas adjacent to the pond. The correct use of acceptable fertilizers adjacent to the pond will result in better overall water quality and potentially decrease lawn maintenance costs.

As previously noted, algae is partially the result of an abundance of nutrients and an indicator of the productivity of the pond. The Association should limit the source of nutrients that enter the pond to reduce the productivity of the water and slow the process of eutrophication. Minimization of suspended or dissolved nutrients is important in the long-term management of the pond. There are several ways the Association can administer the concentration of nutrients in the pond. These management methods include aeration, chemical treatments, dredging, erosion control, plantings and pond liners. We discuss each management method below.

Aeration - Associations often consider the use of small pumps, motors and aerators to circulate pond water. These devices increase the amount of entrained oxygen in the water, increase water quality and reduce algae growths. Thornhill presently utilizes an aerator. We are not aware of any operational deficiencies

with the aerator at an age of two years. The aerator has a useful life of up to 15 years. Based on its current age, we recommend the Association anticipate its replacement by 2017 and every 15 years thereafter. Line Item 14 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times of replacements.

Chemical Treatments - Another method to slow eutrophication is the use of algae-killing chemical treatments. Introduction of a metal compounds, such as copper sulfate, to the water renders the nutrients inactive to the algae. Chemical treatments reduce suspended solids, decrease the turbidity and improve the color of the water. Typically, moderate to high levels of algae growth are most common in summer months and often due to high levels of nutrients or fertilizers used on the adjacent lawns. Nutrients significantly contribute to the growth of algae blooms. We recommend the Association consider as a last resort the use of chemical treatments to control algae growth in the pond. The Association should first obtain all permits necessary for the use of chemical treatments. The Association should fund this ongoing maintenance activity through the operating budget if required.

Dredging - The gradual build-up of natural debris, including tree leaves, branches and silt, may eventually change the topography of areas of the pond. Dredging of a pond becomes necessary if this accumulation alters the pond water quality. Dredging is the optimal but also the most capital intensive method of pond management.

We recommend Thornhill monitor the possible decline of water quality and document silt build-up to determine the future need for dredging. The specific amount of material to dredge may vary due to the fluctuating characteristics of silt accumulation, future erosion through wave action and storm water runoff and animal habitats. The Association should consider a bathymetric profile of the pond to determine the water depth and location of silt build up and fund this expense through the operating budget

Construction of neighboring associations resulted in the build-up of silt in the pond. Therefore, it was necessary for the Association to dredge the pond in 1998. The Association spent approximately \$110,000 to dredge 7,000 cubic yards of silt. The pond was drained at the time of dredging. Thornhill installed a forebay, or silt trap, at that time to collect silt at the upstream side of the pond.

During our inspection we noted the pond water has a brown tint which could indicate silt continues to collect in the pond. We also noted erosion at the west shoreline. The Association anticipates dredging the entire pond by 2024 at a current cost of \$80,000. In addition, the Association anticipates dredging the forebay every four years beginning in 2007 at a current cost of \$7,500. We include the Association's anticipated cost plus inflation and anticipated times of dredging on Line Items 15 and 16 of **Exhibit B Reserve Expenditures**.

Erosion Control - The pond shoreline comprises 1,500 linear feet of natural vegetation and 100 linear feet of stone rip-rap. Shorelines are subject to

fluctuations in water levels, increased plant growth and migrating storm and ground water. The steep shoreline embankments are likely to exacerbate soil movement and erosion. We noted erosion at the west shoreline and also at the pavilion entrance. Pages 5 and 6 of **Exhibit A Photographs** depict these conditions. We recommend that the Association plan to install and augment the existing stone rip-rap at these eroded areas in 2005. Thornhill should anticipate similar repairs every 15 years or in conjunction with dredging. Line Item 17 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times to address soil erosion with new and additional rip-rap. We suggest the Association fund ongoing care of the shoreline landscape and ground cover through the operating budget.

Plantings - Control of the type and amount of certain plants at the water inlets and shoreline affects the amounts of suspended nutrients entering the water system. The use of native plants and ground covers stabilize the embankment soils most subject to erosion and help filter some of the nutrients around drainage and shallow points. We recommend the Association consider the addition of native plants and ground covers to reduce erosion and fund this ongoing maintenance activity through the operating budget.

Pond Liners - Synthetic pond liners prevent the exchange of nutrients from the bottom of a pond into the above water and therefore decrease the ability of algae to grow. A pond liner can trap air or other dissolved gases beneath the liner. This can cause the liner to float to the surface, although liners are available with pores

for gas migration. The use of a pond liner offers good temporary control, but requires the periodic removal and clearing of any growth. We do not consider a pond liner necessary or desirable for the subject pond.

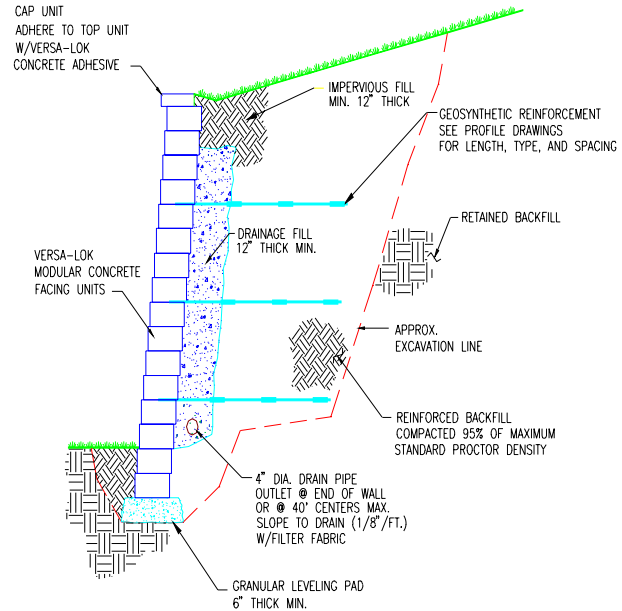
The above management methods will help to maintain the pond and potentially reduce more costly future maintenance expenditures. Line Items 14 through 17 of **Exhibit B Reserve Expenditures** note our estimate of future costs and anticipated times of pond maintenance.

Pond, Pedestrian Bridges - Thornhill maintains two wood pedestrian bridges at the pond and each bridge comprises 140 square feet. One bridge is in poor condition and the other is in good to fair condition. We estimate a useful life of 12- to 18-years for the bridges and recommend the Association budget for replacement of one bridge every nine years beginning by 2006. The Association should fund interim repairs through the operating budget.

Retaining Walls, Timber - The Association maintains 850 square feet of timber retaining walls at the west shoreline of the pond. The retaining walls are in fair overall condition at an age of six years. Timber retaining walls have a useful life of 15- to 20-years. The walls are experiencing premature deterioration. We recommend the Association anticipate replacement of

the walls by 2008. We advise that Thornhill replace the timber walls with modular, interlocking *dry-set masonry retaining walls*, such as manufactured by Keystone™ or Versa-Lok.™

The adjacent schematic drawing depicts this type of retaining wall. The cost of *dry-set masonry retaining walls* is similar to the cost of timber walls. However, dry-set masonry retaining walls offer a longer useful life of up to 35 years and lower total maintenance costs. Line Item 19 of **Exhibit B Reserve Expenditures** notes our estimate of future cost and anticipated time of replacement.



Signage - The Association maintains metal and wood signs throughout the community. The functional useful life of these signs is up to 20 years. The community signs contribute to the overall aesthetic appearance to owners and potential buyers. Replacement of community signs is often predicated upon the desire to "update" the perceived identity of the community rather than for utilitarian concerns. Therefore, the specific times for the replacement of the signs is discretionary. We recommend the Association plan to update the signs by 2009 and again by 2029. We base our cost on the following estimates:

- \$3,200 for each of the seven monument signs
- \$600 for each of the two bulletin boards
- \$1,200 for each of the six miscellaneous property identification signs

Line Item 20 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times of replacements.

Tennis Courts, Color Coat - Thornhill maintains 1,420 square yards of asphalt comprising two tennis courts. The tennis court color coat surfaces are in overall good condition at an age of three years. We recommend the Association apply a new color coat to the asphalt tennis courts every five- to seven-years to maximize the useful life of the courts. Prior to the application of the color coat, the Association should require the contractor to rout and fill all cracks with hot emulsion. This deters water infiltration and further deterioration of the asphalt playing surface. We advise the Association to perform crack repairs and apply a new color coat to the asphalt surface by 2006, 2012, 2022 and 2028. These repairs are coordinated with future surface replacements.

Tennis Courts, Fence - The tennis courts are enclosed by 450 linear feet of vinyl coated metal chain link fence. The chain link fence is in fair condition at an age of 14 years. Chain link fence of this type has a useful life of up to 25 years. We recommend the Association anticipate replacement of the tennis court chain link fence by 2011. Line Item 22 of **Exhibit B Reserve Expenditures** notes our estimate of future cost and anticipated time of replacement.

Tennis Courts, Surface Replacement - As stated previously, a total of 1,420 square yards comprise the two asphalt tennis courts at Thornhill. The tennis courts are in good overall condition at an age of three years. The courts were resurfaced in 2001 with recycled asphalt. Similar to other asphalt elements, these courts are subject to soil movements and have useful lives of 15- to 20-years. In consideration of the observed condition, we recommend the

Association anticipate replacement of the tennis courts by 2016 and again by 2031. Line Item 23 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times of replacements. We recommend replacement of the tennis standards from the operating budget on an as needed basis.

Pool and Pool House Elements

Concrete Deck, Inspection and Repairs - A concrete deck surrounds the pools and comprises approximately 9,200 square feet. The useful life of a concrete pool deck is up to 60 years. The concrete is in good overall condition at an age of 14 years. Approximately one-third of the deck is one- to three-years of age due to the recent expansion. We noted minor areas of concrete deterioration as depicted on Page 7 of **Exhibit A Photographs**. Soil movement and water infiltration underneath the concrete deck can cause significant settlement and cracks in the concrete. The pool deck should also be free of trip hazards for the safety of residents and their guests. We recommend the Association plan periodic partial replacements of the concrete deck and crack repairs by 2008 and every eight years thereafter. The times, amounts and related costs of these replacements may vary due to discretion concerning possible partial and more frequent replacements. However, we judge the amounts shown on Line Item 24 of **Exhibit B Reserve Expenditures** sufficient to budget appropriate reserves.

Covers - Covers protect the pools during the off season. The pool covers protect against unlawful entry and liability exposure, keep the pools clear of unwanted leaves and debris, and protect the pools from harsh conditions during winter. The useful life of the pool covers is up to 12 years. The covers were replaced in 1997. We recommend Thornhill anticipate replacement

of these covers every 12 years beginning by 2009. Line Item 25 of **Exhibit B Reserve Expenditures** notes our estimate of future costs and anticipated times of replacement.

Doors, Metal - Seven metal doors provide access to the pool rooms. The metal doors exhibit significant rust. Page 8 of **Exhibit A Photographs** depicts this condition. Due to their exposure to pool chemicals, these metal doors have a useful life of up to 15 years. The Association provided a cost of \$1,000 for three “high” grade doors and anticipate their replacement in 2005 and again by 2020. The Association also provided a cost of \$1,000 for four “medium” grade doors and anticipate their replacement by 2010 and again by 2025. Line Items 26 and 27 of **Exhibit B Reserve Expenditures** note the Association’s costs and anticipate times of replacements for these seven doors.

Fence, Chain Link - Approximately 340 linear feet of a chain link fence surrounds the pool deck. The pool fence is in good overall condition at an age of 14 years. This type of fence has a useful life of up to 25 years. The Association anticipates replacement of the chain link fence with a metal picket fence by 2011. Line Item 28 of **Exhibit B Reserve Expenditures** notes our estimate of future cost and anticipated time of replacement.

Fence, Metal Picket - Approximately 120 linear feet of a light gauge metal picket fence is found at the pool. The picket fence is in good overall condition at an age of two years. This type of fence has a useful life of up to 25 years. We recommend the Association anticipate replacement of the metal picket fence at the pool by 2027.

Main Pool and Baby Pool - The Association provided information regarding the costs, useful lives and replacement times of the main pool and baby pool elements. We reflect this information on Line Items 30 through 40 of **Exhibit B Reserve Expenditures**.

Furniture - Associated furniture and fixtures around the pool includes 24 chairs, 65 lounges, six tables and six umbrellas. The Association informs us this equipment was replaced in 2004. Pool furniture has a useful life of up to 10 years. We recommend the Association budget an allowance for replacement of the pool furniture by 2014 and every 10 years thereafter. The times and costs of these replacements may vary. However, we judge the amounts shown on Line Item 41 of **Exhibit B Reserve Expenditures** sufficient to budget appropriate reserves. The Association should fund replacement of the safety equipment through the operating budget.

Light Fixtures, Bollard - Sixteen bollard light fixtures illuminate the pool deck. The Association informs us that these lights are not operational. The Association anticipates replacement in 2005. We recommend a subsequent replacement by 2025.

Light Posts and Fixtures - The Association uses 10 metal light fixtures atop wood posts to illuminate the pool area. These fixtures are in fair condition at an age of three years and have a useful life of up to 20 years. The Association should anticipate the need to replace the fixtures by 2021. Line Item 43 of **Exhibit B Reserve Expenditures** notes our estimate of future cost and anticipated time of replacement.

Pool House, Interior Renovation - Major interior components of the pool house which will eventually require replacement include plumbing fixtures, toilet partitions, electric radiators, a stereo and light fixtures. We recommend the Association budget for replacement of these elements by 2019 and again by 2034. Thornhill should fund interim replacements, paint finish applications, floor coatings and other minor replacements through the operating budget.

Pool Lights - The Association provided information regarding the cost, useful life and replacement time of the pool lights. We reflect this information on Line Item 45 of **Exhibit B Reserve Expenditures**.

Reserve Study Update - An ongoing review by the Board and an Update of this Reserve Study in two- to three- years are necessary to ensure an equitable funding plan since a Reserve Study is a snapshot in time. Many variables change after the study is conducted that may result in significant homeowner overfunding or underfunding the reserve account. Variables that may affect the Reserve Funding Plan include, but are not limited to:

- Deferred or accelerated capital projects based on Board discretion
- Changes in the interest rates on reserve investments
- Changes in the *local* construction inflation rate
- Additions and deletions to the Reserve Component Inventory
- The presence or absence of maintenance programs
- Unusually mild or extreme weather conditions
- Technological advancements

Periodic updates incorporate these variable changes since the last Reserve Study or Update.

The Association can expense the fee for an Update with site visit from the reserve account. This fee is included in the Reserve Funding Plan. We base this budgetary amount on updating the same property components and quantities of this Reserve Study report. Budgeting for an Update demonstrates the Board's objective to continue fulfilling its fiduciary responsibility to maintain the commonly owned property and to fund reserves appropriately.

Explanation of the Exhibits

Exhibit A *Photographs* documents the conditions of various property components as of the date of our visual inspection, March 19, 2004. The previous section, Condition Assessment, contains several references to these photographs.

Exhibit B *Reserve Expenditures and Reserve Funding Plan* covers a 30-year period. Information about the Reserve Components and Expenditures for the most relevant next 20 years (2004 through 2024) are found on a convenient 11- by 17-inch foldout spreadsheet. The remaining 10 years (2025 through 2034) follow in a concise 8½- by 11-inch table. Data for each Reserve Component is presented on a single row with columns of information as follows:

- Line Items are included for reference purposes
- Total Quantities are the total anticipated quantity for replacement during the next 30 years (*this is not necessarily the “total” quantity maintained by the Association as this quantity may represent more than one Useful Life cycle or a partial replacement*)
- Per Phase Quantities are the anticipated quantity for each replacement event
- Units clarify the unit of measure used to quantify the elements
- Reserve Component Inventory identifies each Reserve Component
- The Estimated First Year of Replacement is included to help the Association understand the priority of future Reserve Expenditures
- Results of the Life Analysis show both the total Useful Life and Remaining Useful Life for each Reserve Component
- Unit Cost is the cost per unit we used to calculate the per phase cost
- The 2004 Cost of Replacement Per Phase is the per phase cost in today’s dollars
- The Total Future Costs of Replacement is the total cost for all phases of replacement during the next 30 years and *includes* the effects of inflation at a 3.5% annual percentage rate
- The remaining columns in Reserve Expenditures 11- by 17-inch foldout spreadsheet present the estimated future inflated costs for each for the next 20 years, and

- The remaining 10 years of future Reserve Expenditures from years 2025 to 2034 follow in a concise 8½- by 11-inch table.


Exhibit B Reserve Funding Plan includes the Cash Flow Analysis and recommended Reserve Contributions for the next 30 years based on the Reserve Expenditures and a 2.5% annual percentage rate earned on the average annual fund balances. The specific information found on the last 11- by 17-inch foldout spreadsheet includes:


- Reserves at Beginning of Year,
- Recommended Reserve Contribution (positive cash flow),
- Estimated Interest Earned,
- Anticipated Expenditures (negative cash flow),
- Anticipated Reserves at Year End, and;
- Predicted Reserves (based on current funding levels).

Exhibit C Reserve Funding Graphs contains two graphs and a pie chart based on the numerical data found in the Reserve Funding Plan. The graphs illustrate our recommendations and observations pertaining to reserve balances, recommended annual Reserve Contributions and Reserve Expenditures during the next 30 years.

The graph Recommended Reserve Funding Plan shows the following data points:

--□-- Recommended Reserve Balances that are the result of expenditures as matched against existing reserves and contributions to reserves

 Recommended Reserve Contributions or special assessment that increase reserves

 Reserve Expenditures

The second Reserve Funding Graph titled Reserve Balances compares the recommended year-end amounts of reserves with the potential shortage of reserves if the Association were to continue contributing to reserves at its current budgeted amount for the next 30 years. The potential shortages are based on matching the estimated future Reserve Expenditures against existing reserves and current annual amounts of Reserve Contributions. This second graph answers the hypothetical question of when a shortfall in reserves could occur if there were no change in the annual budget of Reserve Contributions.

The pie chart Estimated Future Reserve Expenditures illustrates the relative importance of the Reserve Expenditures and relative funding during the next 30 years. Thornhill can regard reserve needs for these expenditures as requiring a similar allocation of existing reserves and future Reserve Contributions.

Exhibit D describes Assumptions of the Reserve Study of how we collect and analyze data. The statement of Professional Service Conditions identifies the general manner of professional services provided, as stated in the original authorized Confirmation of Services for this Reserve Study.

Exhibit E *Credentials* contains the Firm's Qualifications, Staff Qualifications and the vitae of the Responsible Advisor and Review Coordinator. Theodore J. Salgado and John P. Poehlmann are the principals of Reserve Advisors, Inc., Justin J. Maier conducted the visual inspection of Thornhill Community Association, Inc. and Matthew C. Kuisle served as Review Coordinator for this Reserve Study.

CONCLUSION

At the direction of the Board that recognizes the need for proper reserve planning, we have conducted a *Precision 20/20 Full Reserve Study* of Thornhill Community Association, Inc. (Thornhill) located in Charlotte, North Carolina and submit our findings in this report. The effective date of this study is the date of our visual, noninvasive inspection, March 19, 2004. This Reserve Study is a budget planning tool that identifies the current status of the reserve fund and a stable and equitable Reserve Funding Plan to offset the anticipated future major common area expenditures.

We identified the anticipated Reserve Expenditures for Reserve Components during the next 30 years as either near term or long term. *Near term* expenditures relate to capital needs from now through 2009, the next five years beyond this current fiscal year. These *near term* expenditures comprise \$240,219 or about seventeen percent (17.1%) of the next 30 years of **Exhibit B Reserve Expenditures**. The current Reserve Expenditures relate primarily to replacement of playground equipment, wood retaining walls, signage and erosion control.

The Association budgeted \$35,071 for Reserve Contributions in 2004. We recommend that the Association adopt a reserve budget of \$38,800 in 2005. Afterwards, the Association should budget gradual annual increases in reserve funding, that in part consider the effects of inflation through 2034, the limit of this study's Cash Flow Analysis. The recommended year 2005 Reserve Contribution of \$38,800 is \$3,729 more than the prior budgeted amount and represents about a two percent (1.9%) adjustment in the 2004 total Operating Budget of \$193,644. This annual adjustment of \$3,729 is equivalent to an average monthly increase of \$.64 per unit owner. These contributions will gradually create and maintain a Reserve Fund for the

major expenditures as identified in **Exhibit B. Exhibit B Reserve Funding Plan** enumerates the details regarding recommended annual Reserve Contributions and projected year end reserve balances.

Based on the investigation and analysis as detailed in the accompanying narrative, we recommend the following Reserve Contributions to fund the expected expenditures of the subject Reserve Components during the next 30 years.

Recommended Reserve Contributions

Year	\$	Year	\$	Year	\$
2005	38,800	2015	49,700	2025	63,600
2006	39,800	2016	50,900	2026	65,200
2007	40,800	2017	52,200	2027	66,800
2008	41,800	2018	53,500	2028	68,500
2009	42,800	2019	54,800	2029	70,200
2010	43,900	2020	56,200	2030	72,000
2011	45,000	2021	57,600	2031	73,800
2012	46,100	2022	59,000	2032	75,600
2013	47,300	2023	60,500	2033	77,500
2014	48,500	2024	62,000	2034	79,400

The Reserve Funding Plan recommends 2034 year end accumulated reserves of approximately \$539,000. We judge this amount of accumulated reserves in 2034 desirable or necessary, in part, to fund the likely replacement of the irrigation system and pool structure shortly after 2034.

An ongoing review by the Board and an Update of this Reserve Study in two- to three-years are necessary to ensure a continued equitable funding plan since a Reserve Study is a

snapshot in time. Many variables change after the Reserve Study is conducted that may result in significant homeowner overfunding or underfunding. Examples include deferred or accelerated capital projects based on Board discretion, changes in the interest rates on reserve investments; and changes in the *local* construction inflation rate.

SUPPLEMENTARY INFORMATION FOR FINANCIAL STATEMENTS

The *Audit and Accounting Guide for Common Interest Realty Associations* presents recommendations on Supplementary Information on Future Major Repairs and Replacements in end of fiscal year Audits of Financial Statements for community associations⁸. Accountants use discretion and judgment on how to present the Supplementary Information on Future Major Repairs and Replacements. However, the Supplementary Information on Future Major Repairs and Replacements often references and includes excerpts from our Reserve Studies. The following table excerpts significant unaudited information from the Reserve Expenditures about Reserve Component categories and estimated current and future replacement costs based on inflation at an annual rate of 2.5%.

Unaudited Supplemental Information on Future Major Repairs and Replacements

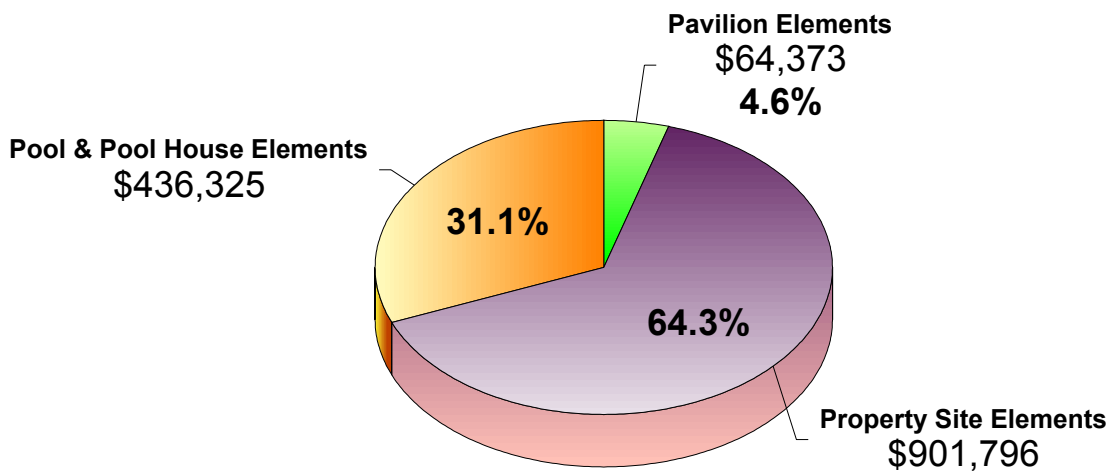
<i>Reserve Component Categories</i>	<i>Total Current Replacement Costs</i>	<i>Total Future or Inflated Replacement Costs</i>	<i>% of Total Future Replacements</i>	<i>Component of Projected 2004 YE Fund Balance</i>
Pavilion Elements	\$43,590	\$64,373	4.6%	\$3,046
Property Site Elements	\$617,132	\$901,796	64.2%	\$42,668
Pool & Pool House Elements	\$284,975	\$436,325	31.1%	\$20,645
Reserve Study Update	\$2,200	\$2,200	0.2%	\$104
Totals	\$947,897	\$1,404,694	100%	\$66,463

The information included in the table above may be included as part of the Supplementary Information on Future Major Repairs and Replacements. *However, Reserve Advisors, Inc. does not certify that the information in the table will fully satisfy the recommendations of the AICPA guideline.*

⁸ American Institute of Certified Public Accountants (AICPA) *Audit and Accounting Guide - Common Interest Realty Associations*; American Institute of Certified Public Accountants, Inc.; 2003

The most important category of Reserve Components noted in **Exhibit B Reserve Expenditures** is Property Site Elements (64.3%). The following chart illustrates the relative importance of the Reserve Expenditures and relative funding during the next 30 years.

Estimated Future Reserve Expenditures Relative Illustration of Costs Thornhill Community Association, Inc.



DEFINITIONS¹

Cash Flow Method - A method of calculating Reserve Contributions where contributions to the reserve fund are designed to offset the variable annual expenditures from the reserve fund. Different Reserve Funding Plans are tested against the anticipated schedule of reserve expenses until the desired funding goal is achieved.

Current Cost of Replacement - That amount required today derived from the quantity of a *Reserve Component* and its unit cost to replace or repair a Reserve Component using the most current technology and construction materials, duplicating the productive utility of the existing property at current local market prices for materials, labor and manufactured equipment, contractors' overhead, profit and fees, but without provisions for building permits, over time, bonuses for labor or premiums for material and equipment. We include removal and disposal costs in the cost of replacement where applicable.

Funding Goal - The stated purpose of this Reserve Study to determine the adequate, not excessive, future annual, reasonable *Reserve Contributions* to fund future *Reserve Expenditures*.

Future Cost of Replacement - *Reserve Expenditure* derived from the inflated current cost of replacement or current cost of replacement as defined above, with consideration given to the effects of inflation on local market rates for materials, labor and equipment.

Long-Lived Property Component - Property component of Association responsibility not likely to require capital repair or replacement during the next 30 years with an unpredictable remaining Useful Life beyond the next 30 years.

Remaining Useful Life - The estimated remaining functional or useful time in years of a *Reserve Component* based on its age, condition and maintenance.

Reserve Component - Property elements with: 1) Association responsibility; 2) limited Useful Life expectancies; 3) predictable Remaining Useful Life expectancies; and 4) a replacement cost above a minimum threshold.

Reserve Component Inventory - Line Items in **Exhibit B Reserve Expenditures** that identify a *Reserve Component*.

Reserve Contribution - An amount of money set aside or *Reserve Assessment* contributed to a *Reserve Fund* for future *Reserve Expenditures* to repair or replace *Reserve Components*.

Reserve Expenditure - *Future Cost of Replacement* of a *Reserve Component*

Reserve Fund Status - The accumulated amount of reserves in dollars at a given point in time, i.e., at year end.

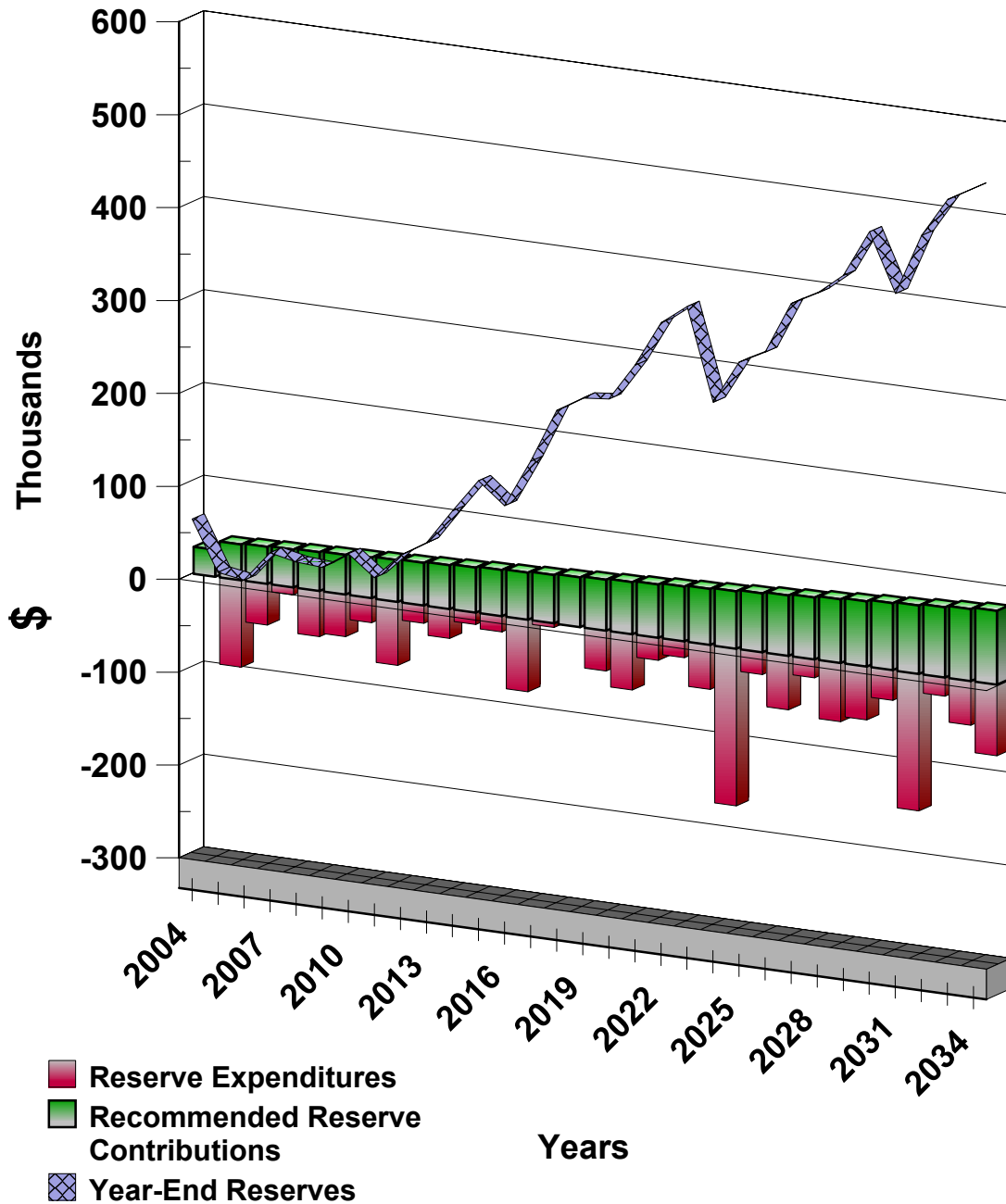
Reserve Funding Plan - The portion of the Reserve Study identifying the *Cash Flow Analysis* and containing the recommended Reserve Contributions and projected annual expenditures, interest earned and reserve balances.

Reserve Study - A budget planning tool that identifies the current status of the reserve fund and a stable and equitable Funding Plan to offset the anticipated future major common area expenditures.

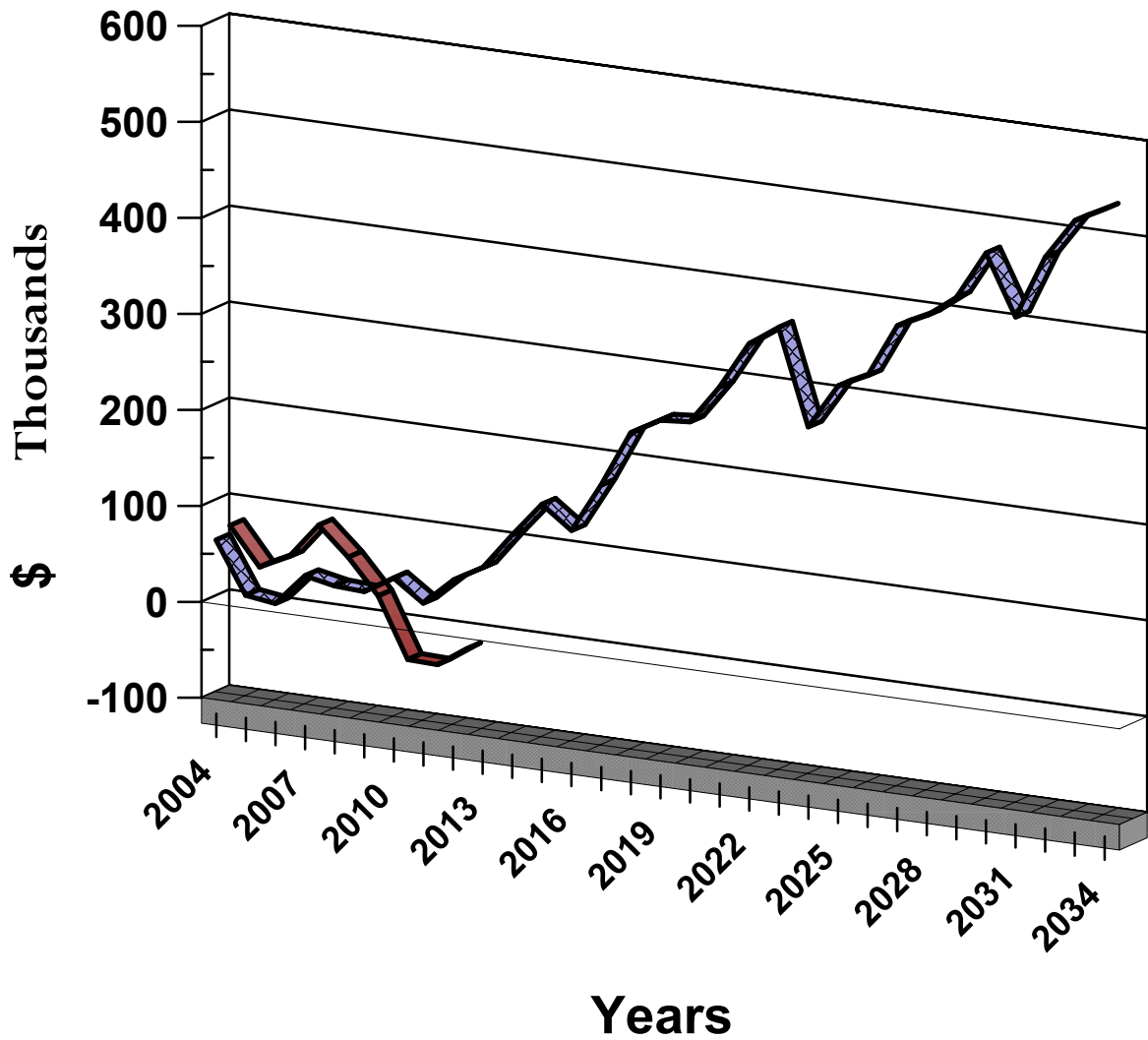
Useful Life - The anticipated total time in years that a *Reserve Component* is expected to serve its intended function in its present application or installation.

¹ Definitions are derived from the standards set forth by the Community Associations Institute (CAI) representing America's 250,000 condominium and homeowners associations and cooperatives, and the Association of Professional Reserve Analysts, setting the standards of care for reserve study practitioners.

Recommended Reserve Funding Plan Thornhill Community Association, Inc.



Reserve Balances Thornhill Community Association, Inc.



- ▣ Year-End Reserve Balances Using Recommended Funding
- ▣ Potential Year-End Reserve Balances Using Historical Funding

Estimated Future Reserve Expenditures Relative Illustration of Costs Thornhill Community Association, Inc.

